

**DEFENSE CONTRACT MANAGEMENT  
COMMAND**



# **DCMC Software Initiatives Process Appraisals**

**Lt Col Bob Lang  
DCMC Software Center  
DCMDE Commander Confe  
16 Feb 00**



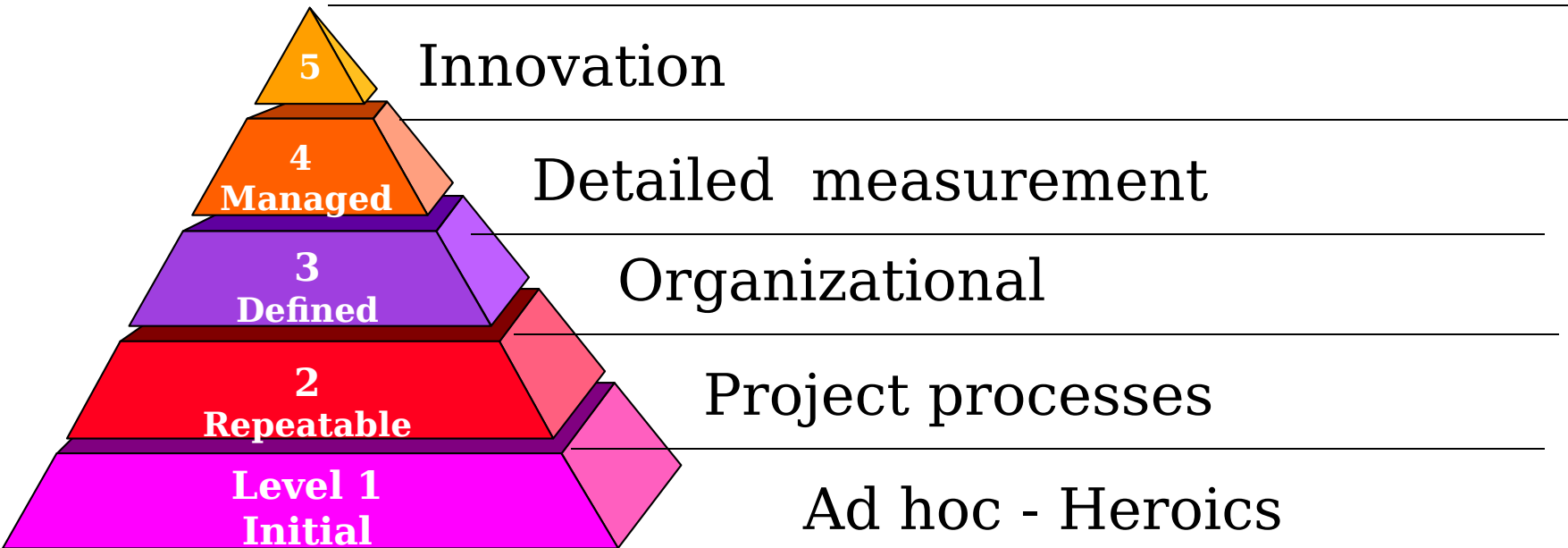
# Overview

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- Why Process Appraisals?
  - Federal Acquisition Regulation [42.302(a)(41)]
  - Single Most Important Aspect Regarding Quality of End Product
  - DoD Software Late and Over Cost
- DCMC Process Appraisal Initiatives
  - Take advantage of Software Engineering Institute (SEI) Capability Maturity Models (CMMs)



# SEI CMM Structure



- Determines software development **process** capability
- Defacto Government/Industry Standard



# It Seems to be Working

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By reaching CMM level III, Lockheed Martin Tactical Aircraft Systems [over 5 year period];

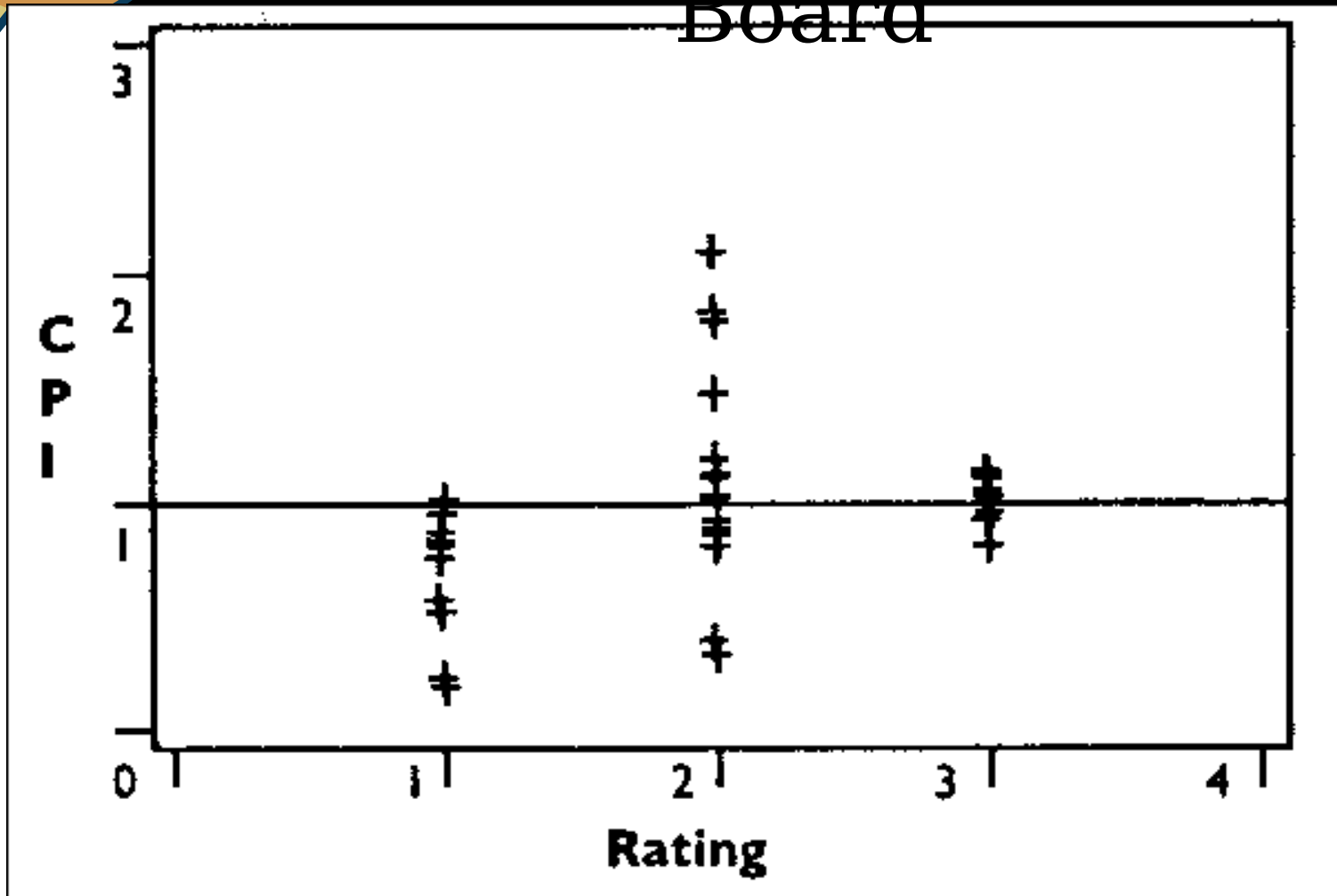
- Cut software defects 90%
- Reduced software development costs 50%

Aviation Week & Space Technology

Lockheed Martin Restructures TAS Unit as 'Fighter Enterprise', July 28 1997, page 64



# ...And Working Across the Board



Air Force Institute of Technology <sub>5</sub>



# Recent DoD Policy

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## DUSD (AT&L) Letter, 26 Oct 99

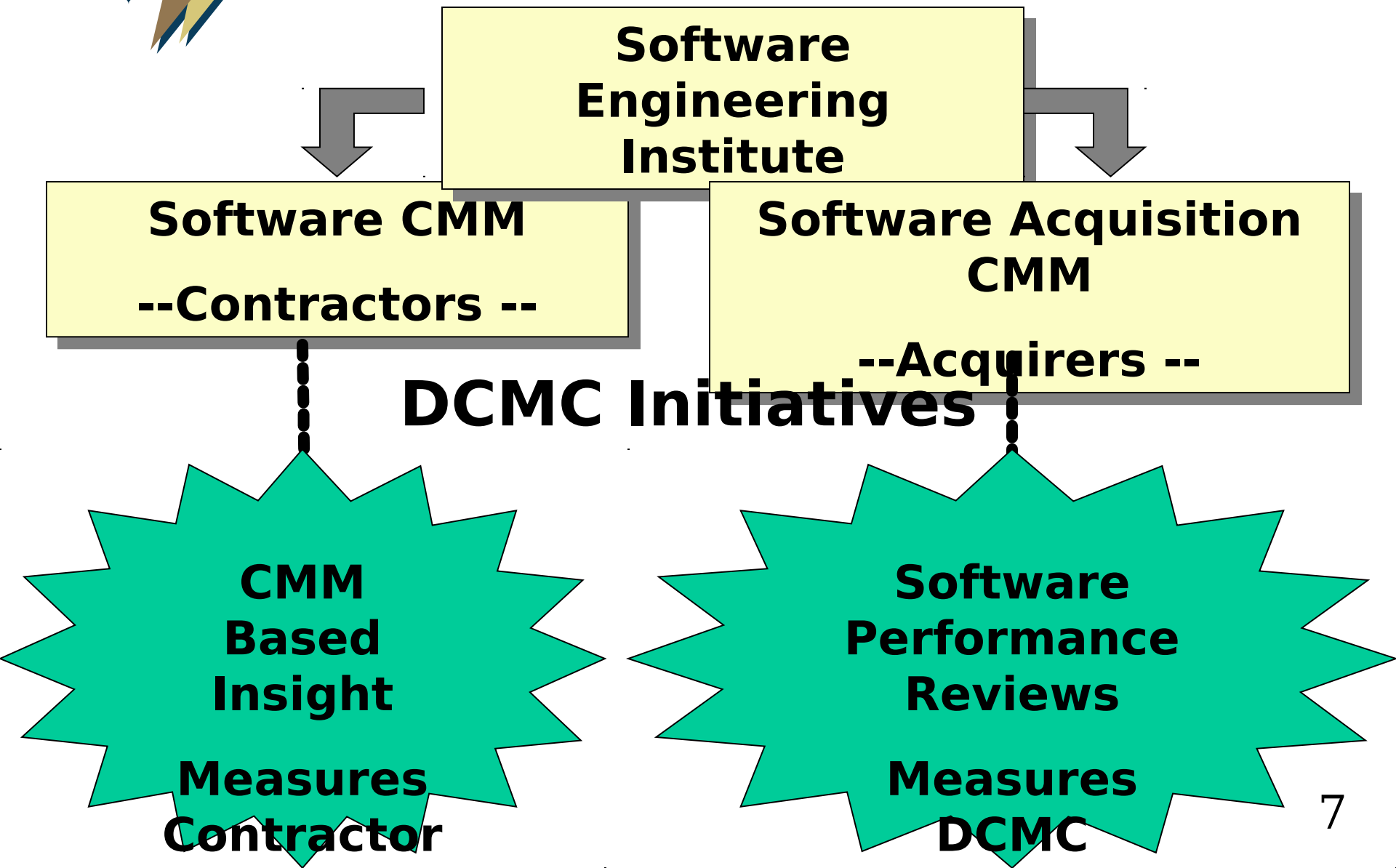
“...requirement for [ACAT I] contract that each contractor...undergo an evaluation...[to determine] full compliance with SEI Capability Maturity Model Level 3...or... equivalent level...[or approved risk mitigation plan]”

DUSD (S&T) Letter, 2 Nov 99; DoD Needs to:

- Determine “Equivalence”
- Find single evaluation technique



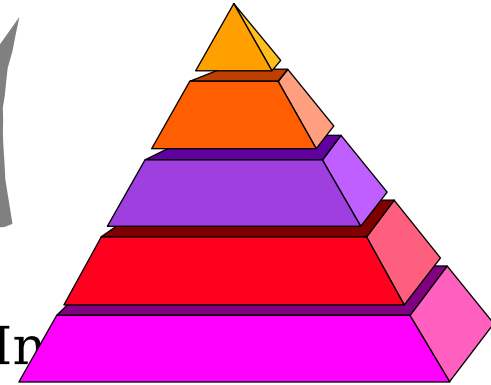
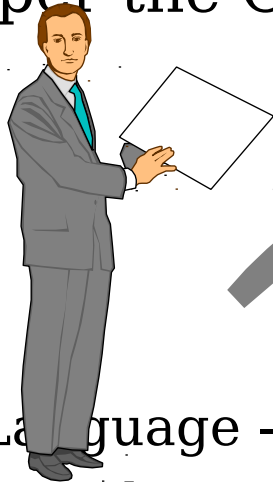
# DCMC Embracing





# CMM Based Insight

- What: Continuous Process Evaluations,  
Primarily based upon daily observations,  
Organized per the CMM

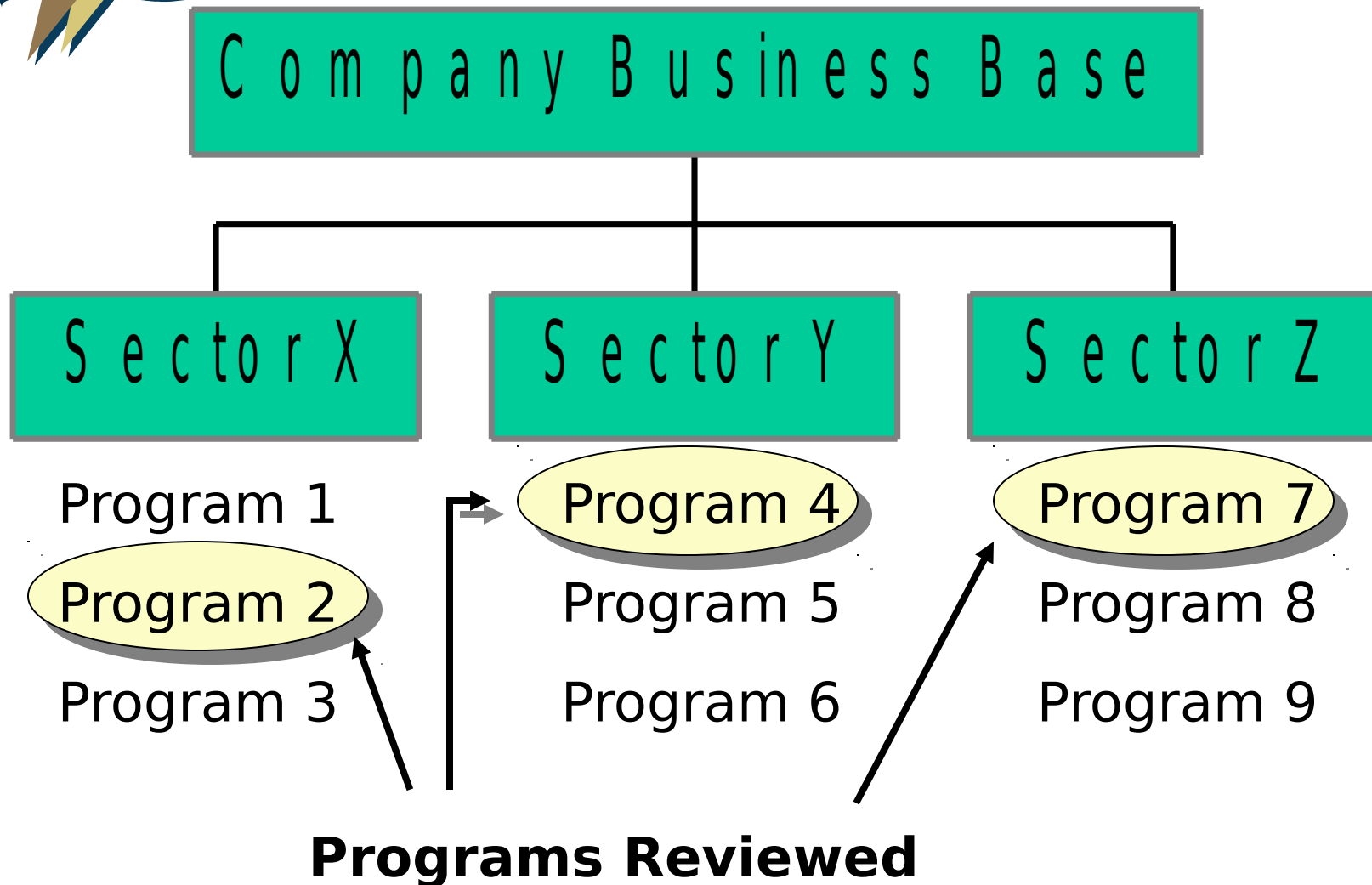


- Why:
  - Common Language - Government & Industry
  - Consistent application (DoD Wide Problem)
  - Eliminate/Reduce external process reviews

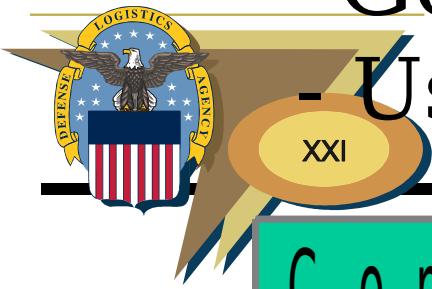




# Company Internal Assessments Based on Representative Sample -

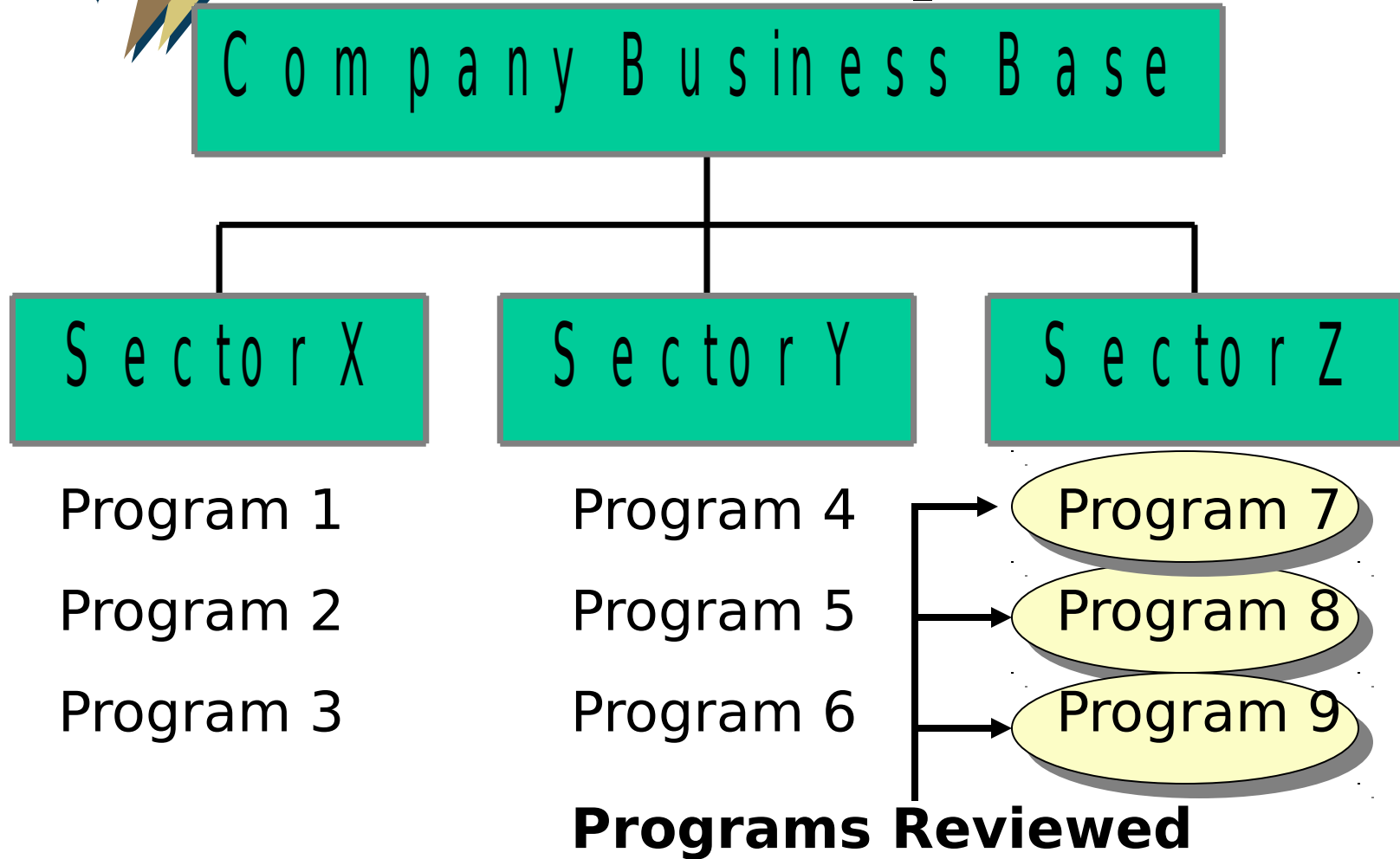


allows "Cherry Picking" (SEI Methodology) - show capability



# Govt SW Capability Evaluations

## - Uses Comparable Domain Program



Rarely results in CMM rating - identifies strengths and weaknesses to identify risk



# DCMC CMM Based Insight -Continuous Eval of Programs

Company Business Base

Sector X

Program 1

Program 2

Program 3

Sector Y

Program 4

Program 5

Program 6

Sector Z

Program 7

Program 8

Program 9

- Advise program offices of specific program status = Risk
- Share data with contractor = Process improvement
- Does not provide company maturity (Only programs overseen)



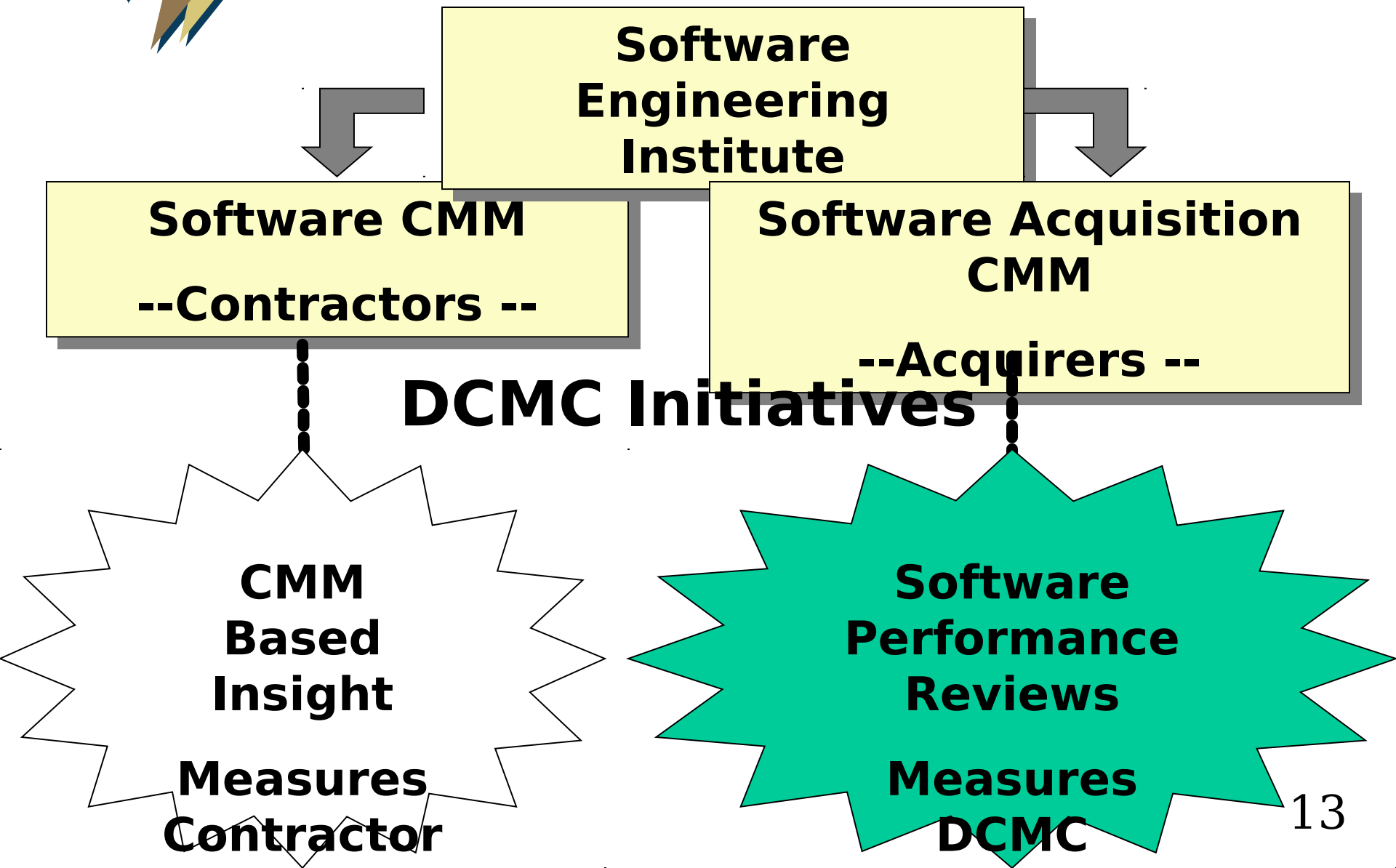
# CMM Based Insight - Implementation

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- Significant Effort + Solves 6+ year DoD problem
- Time table
  - ✓ Methodology: (DCMC SEI Affiliates) Feb 00
  - Phase I: Oct 99 - Jan 00 Mar 00 (Four CAOs)
    - Validate Concept
  - Phase II: Jun- Oct 2000 (Five CAO volunteers)
    - Verify Concept, Validate Data Collection/Tool Prototype
  - Phase III: TBD -Tool Dependent Est: Nov 00 - Feb 01
    - Verify Data Collection/Actual Tool (Five CAO Volunteers)
  - Command-wide start: Est Jul 2001



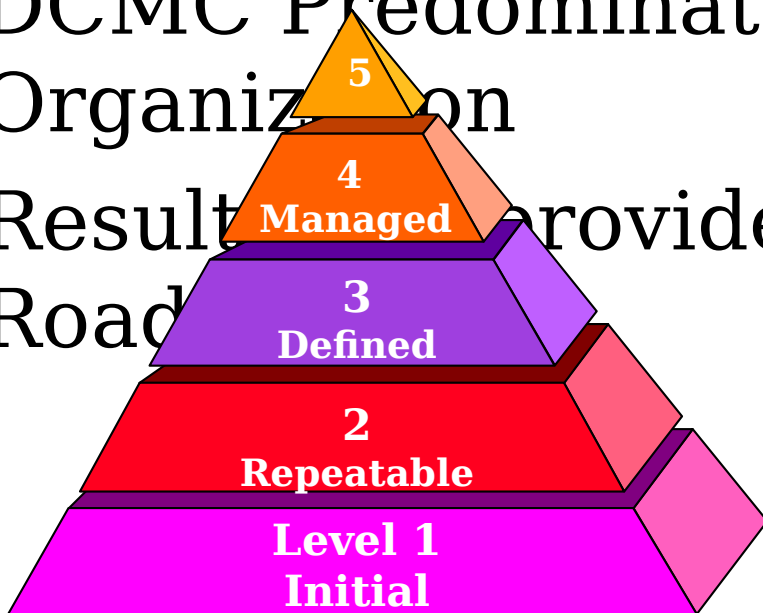
# DCMC Embracing





# Implementation

- Model tailored & pilot tested (Jan - Oct 1999)
- Baseline Reviews 70% complete -Finish Apr 2000
- DCMC Predominately Level 1 Organization
- Results provide Roadmap



**Measuring  
ourselves per  
same SEI  
Framework**



# Summary

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## CMM Based Insight

- FAR Part 42 requires DCMC process evaluations
- Software CMM is the de facto standard
- CMM Based Insight:
  - Continuous Software CMM evaluation
  - DCMC process data in common DoD language
  - Data available for contractor and program offices
- Target deployment: Mar-Jul 2001



# Summary

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## **Software Performance Reviews**

- Measuring DCMC - Same SEI framework
  - Software Acquisition CMM
  - Tailored to DCMC Mission
- Reviews complete April 2000
- Results will provide Command-Wide Roadmap





# Additional Information

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- DCMC Software Center (1-888-616-7598)
  - CMM Based Insight: Lisa Ming
  - DCMC SW Performance Reviews: Gary Gumpright
- Web Page [www.dcmc.hq.dla.mil](http://www.dcmc.hq.dla.mil) (SW Center)
  - “Worth Knowing” - This brief + backup references
  - “Initiatives” - More detailed information
- DCMC Software Conference
  - 18-22 Sep 00: In-depth training on initiatives
- HQ Process Owner:
  - Becky Grant 703-767-7339

End of Brief



# Application - Example (Backup)

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## DCMC Location X

- AMCOM concerned with poor quality software
  - Wanted level 3
- Contractor hired outside consultant to verify operations
  - Believed they were level 3
- AMCOM/DCMC challenged -CMM Observations
- Results:
  - Assessed level I.
  - Contractor on ambitious schedule to reach level III
  - DCMC monitoring progress



# Application - Example (Backup)

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## DCMC Location Y

- ACAT I Program - planned software process review
- DCMC had strengths and weaknesses per CMM
- Result:
  - DCMC data satisfied customer concerns
  - Review not needed
  - Savings of 6 man-days on site plus travel time/costs



# Application - Example (Backup)

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## DCMC Location Z

- Contractor for Army ACAT I Program recently assessed as CMM Level 2 (Internal assessment)
- DCMC concerns:
  - Program not part of the assessment
  - Subcontractor Mgt (Level 2 Area) not met
- DCMC identifying shortcomings (risk areas) to program office in terms of the CMM



# Why Processes ?

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“Today’s major problems with military software development are not technical problems, but management problems”

Software Engineering Institute (SEI)

The Capability Maturity Model, Guidelines for Improving the Software Process,  
Carnegie Mellon University, Addison-Wesley Publishing, 1997, pg 4



# Software Complexity Concern

## A Growing Concern

- **In 1995 85% of Software Projects Finished Over Time or Budget**
- **1/2 of Projects Double Cost Estimates**
- **Projects Slip an Average of 36 Months**
- **1/3 of Projects Cancelled**

*Source: DoD, Improving Software Engineering Practice, Patricia Sanders, Jan 1999*

\*Chart presented by Dr Etter, DUSD(S&T) to DoD Software Collaboration Workshop - 30 J



# ...And Working Across the Board

## Process linked to Performance

**As maturity increases\*, cost and schedule performance indices approach 100% --**

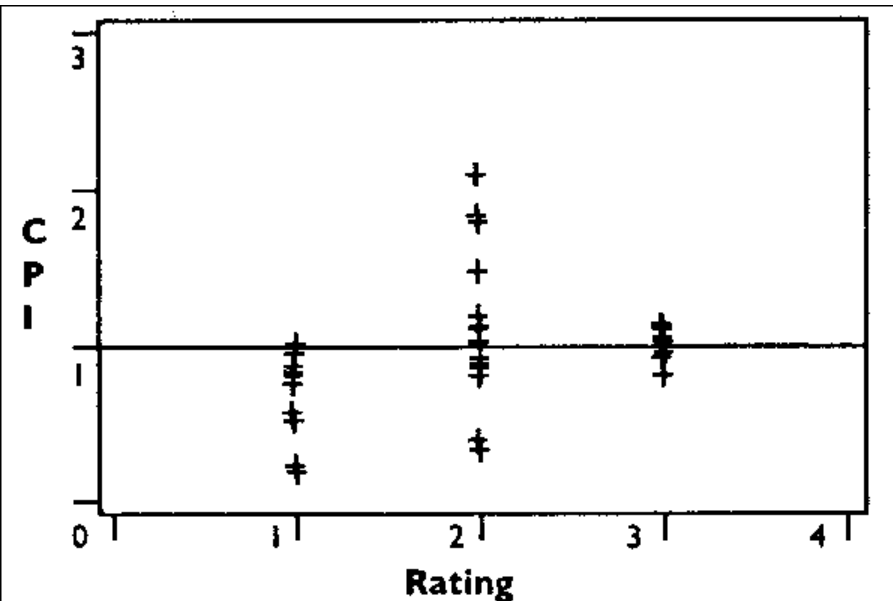


FIGURE 3: SCATTER PLOT OF CPI VS. RATING FOR HIGH AND VERY HIGH RATING RELEVANCE.

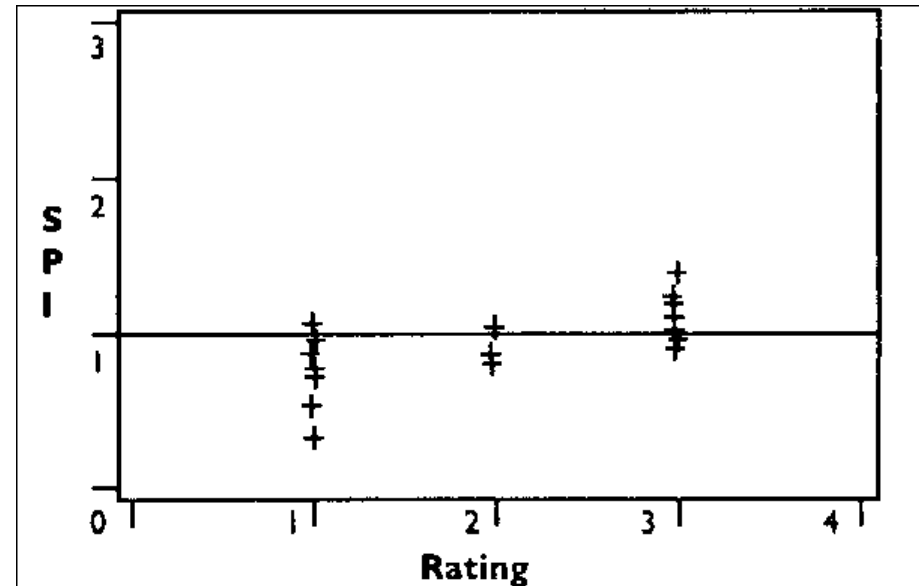


FIGURE 4: SCATTER PLOT OF SPI VS. RATING FOR LESS THAN 80 PERCENT COMPLETE.

Data from Air Force Institute of Technology Thesis, "A Correlation Study of the CMM and Software Development Performance"

([www.stsc.hill.af.mil/Crosstalk/1995/sep](http://www.stsc.hill.af.mil/Crosstalk/1995/sep))

\* Per Software Engineering Institute's (SEI) Software Capability





# Initiative 2: DCMC Software Performance Maturity Model

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“A Level 3 development effort coupled with a Level 1 acquiring effort often equates to a Level 1 delivery capability; yet the Level 3 developer is often blamed, and the Software (SW) CMM is cited as inadequate”

Crosstalk; The Journal of Defense Software Engineering  
August 1999, Pg 2